UNIVERSITY OF GONDAR
COLLEGE OF MEDICINE AND HEALTH SCIENCES
DEPARTMENT OF MIDWIFERY

PERINATAL MORTALITY & ASSOCIATED FACTORS AMONG MOTHERS WHO GAVE BIRTH IN SUHUL HOSPITAL FROM SEPTEMBER 1, 2012 TO 30, AUGUST 2013, SHIRE TOWN TIGRAY REGION, NORTH ETHIOPIA.

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A THESIS SUBMITTED TO THE DEPARTMENT OF MIDWIFERY, COLLEGE OF MEDICINE AND HEATLH SCIENCES, UNIVERSITY OF GONDAR IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTTER OF CLINICAL MIDWIFERY.

MARCH 9, 2015

GONDAR, ETHIOPIA

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Examiner

Acknowledgement

I would like to express my grateful thanks to s/r Workie zemene and s/r Marta Berta my advisors, for their valuable comments and supports from the onset to the completion of this thesis. Had it been without their unreserved academic guidance and encouragement, it would have been difficult if not impossible to bring this work into its present status. I would also wish to thank you all my instructors, data collectors, department of midwifery staffs, University of Gondar staffs, Suhul hospital staffs and my friends who supported me during this thesis preparation.

Acronyms

APGAR-Appearance, Pulse Rate, Grimace, Activity, Respiration

CI- Confidence Interval

CSA-Central Statistical Agency of Ethiopia

EDHS-Ethiopian Demographic Health Survey

GP-General Practitioner

GPNMR-Gross Perinatal Mortality Rate

HO- Health Officer

HRS –Hours

HIV/AIDS- Human Immune Deficiency virus/Acquired Immune Deficiency Syndrome

MDG- Millennium Development Gaol

PNMR- Perinatal Mortality Rate

PROM- Premature Rapture of Membrane

SPSS-Statistical Package for Social science

UoG-University of Gondar

WHO-World Health Organization

Contents

List of tables

List of figure

List of Annexes

ABSTRACT:

Introduction:

Perinatal mortality remains a challenge for the world particularly for the developing nations. It is estimated to be five times higher in developing than in developed countries. One of the key strategies to reduce perinatal mortality and as a result improving the child health system is to identify factors associated with perinatal mortality and develop preventive strategies to decrease perinatal mortality. However; little is known concerning the common factors associated with perinatal mortality in developing nations like Ethiopia.

Objective: The aim was to determine perinatal mortality rate and identify factors associated with perinatal mortality among mothers who gave birth in Suhul hospital from September 2012 to August 30, 2013 shire town, North Ethiopia.

Methods:

Case-control study was conducted among mother who gave birth in Suhul/sharie hospital from September 2012 to August 30, 2013. The study was under taken among 1128 mother who gave birth in Suhul hospital (376 cases and 752 controls). Cases were stillbirths and early neonatal deaths. Controls were those live newborns till discharged from the hospital. Computer based simple random sampling method was employed to select maternal charts from the total deliveries of mothers who gave in Suhul hospital from September 2012 to August 30, 2013.

Result: The gross perinatal mortality rate was found to be 131 per thousand live births. Stillbirths accounted for (86%) of total perinatal mortality. The occurrence of perinatal mortality was higher in those mothers who had no regular antenatal care follow up (AOR=6.9 CI (4.2-11.5). Very low and low birth weight newborns were found to be at increased risk having perinatal mortality (AOR=9.9 CI (4.1-24.5) and (AOR=3.2 CI (1.9-5.3) respectively. Obstetric complications hypertensive disorder (AOR=3.8 CI (1.8-7.8), obstructed labor (AOR=7.7CI (3.1-18.5) and cord accident (AOR=5 CI (1.7-14.) were significantly associated with perinatal mortality.

Conclusion and Recommendation

The perinatal mortality rate in this study was high. Low birth weight obstracted labor, cord accident pregnancy induced hypertension, and absence of antenatal care follow up during pregnancy were factors significantly associated with perinatal mortality. Providing regular health education on the causes of perinatal mortality; encouraging pregnant women to book for antenatal care and improve the utilization of health service institution is very crucial to reduce it.

1. Introduction

1.1. Statement of the problem

According to the World Health Organization (WHO) definition, perinatal mortality for developing countries is defined as the deaths of neonates less than seven days of age and fetal deaths after 28 weeks of gestation. Perinatal mortality rate is the number of fetal deaths after the twenty eighth week of pregnancy and neonatal deaths within the first seven days of life per thousand live births. It is one of the key indicators of the health significance of a given society(1, 2).

Globally, there are more than 6.3 million perinatal deaths per year, almost all of which happen in developing countries, and 27% of them in the least developed countries alone. Out of 6.3 perinatal deaths 3.3 million of them are Stillbirths and 3 million of them are early neonatal deaths. Perinatal mortality is higher in low income countries, particularly those in sub-Saharan Africa and south central Asia. The PMR is five times higher in developing than in developed nations (10 per 1000 and 50 per 1000 total births in developed and developing nations, respectively).
less developed countries, account for 97 percent of the reported Stillbirths and 98 percent of the reported neonatal deaths (1, 3, 4).

The highest neonatal mortality rates and rates of stillbirth take place in sub-Saharan Africa, Asia and Latin America(3, 5). An institutional based study conducted in India identified that the PMR is 99 per thousand live births(6). Although perinatal mortality is highest in Africa little information is available on the PMR and factors associated with perinatal mortality. In Africa an institutional based study done in Nigeria shows that the PMR is 84.6/1000(7).
According to EDHS 2011 estimation the PMR of Ethiopia is 46 per 1000 birth lives and the PMR of the Tigray region national state is 51per thousand live births.
In Ethiopia an intuitional based study conducted in Hawassa teaching hospital revealed that the PMR is 90/1000(8).

The causes and determinants of perinatal mortality are multifactorial and characterized by a chain of events (4). Although it is impossible to single out one factor as the only cause of the Perinatal death, stillbirths and neonatal deaths may stem from poor maternal health, inadequate care during pregnancy, inappropriate management of complications during pregnancy and delivery, poor hygiene during delivery and the first critical hours after birth, and lack of newborn care(1).

This Study is conducted targeting to determine the PMR and identify the factors associated with perinatal mortality in Suhul hospital shire town Tigray region, North Ethiopia 2014.

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1.2. Literature review

1.2.1. Perinatal mortality rate

Current estimations revealed that the perinatal mortality rate is five times more in developing countries than in developed countries (10 per 1000 and 50 per 1000 total births in developed and developing nations, respectively)(4).

A Hospital based study done in India showed the perinatal mortality rate in the study was 79.0 per 1000 births, the contribution to this from stillbirths being 46.4 per 1000 and from early neonatal deaths, 34.1 per 1000(9).A study done in turkey demonstrated that of the total 92 587 babies born 3229 were lost during the perinatal period giving a PNMR of 34.9 per1000(10). Another urban population based cohort study conducted in Pakistan revealed that the PMR(stillbirths plus all early neonatal deaths) was 70.4 per 1000 birth (11).

Concerning to Africa a research done in rural Northern Ghana showed that a perinatal mortality rate of 39 deaths per 1000 live births. Another research done in Malawi There were 264 perinatal deaths (148 late fetal deaths and 116 early neonatal deaths), resulting in a perinatal mortality rate (PMR) of 68.3 per 1000 births.(12, 13). In Ethiopia the 2011 EDHS report showed that the perinatal mortality rate was 46 per thousand live births. The difference between this study and the national report might be due hospital based and community based study of the national report.

1.2.2. **Factors associated with perinatal mortality among mothers who gave birth in Suhul hospital from September 2012 to August 30, 2013**.

Perinatal mortality has many causes and determinants. Across the globe the causes of perinatal deaths are markedly similar, even though their relative significance varies between nations, regions and income status (1, 4).

1.2.2.1. Socio demographic and Obstetric Characteristics among mothers who gave birth in Suhul hospital from September 2012 to August 30, 2013.

A study done in India showed that residence had no association with perinatal mortality. But maternal biological factors like age over 30 years was significantly associated with an increased risk of perinatal mortality(9).

1.2.2.2. Obstetrics and maternal condition among mothers who gave birth in Suhul hospital from September 2012 to August 30, 2013.

Having regular ANC follow up reduces perinatal mortality. A study done in India revealed that lack of antenatal care was significantly associated with high perinatal mortality rate (OR =5.5, 95% CI (1.58–19.16).Another study conducted in Gambia showed those who had no antenatal care followup were (AOR=4.45(0.84–23.43) at increased risk of having perinatal mortality(14, 15)

1.2.2.3. Fetal factors and newborn condition among mothers who gave birth in Suhul hospital from September 2012 to August 30, 2013.

Fetal factors like gestational age, birth weight, and fetal presentation are significantly associated with perinatal mortality.

Study conducted in Ahmedabad, India shows perinatal mortality was very high among low-birth-weight preterm infants, and decreased exponentially with increasing birth weight and gestational period. Compared with full-term, normal-birth-weight infants, the relative risk (RR) of perinatal mortality was very high for preterm low-birth-weight babies (RR = 21.2, 95%CI = 17.8-25.2), but only moderately increased for full-term low-birth-weight babies (RR = 2.6, 95%CI = 2.1-3.2)(9).

A Study done in Nigeria shows that, birth weight, was the significant fetal factors influencing perinatal deaths(7).A study done in Ethiopia shows Newborns with very low (AOR=6.2 (6.06-43.02) and low birth weight AOR=1.7 (0.95-2.97) were responsible for 27.2% of the total perinatal deaths with case fatality rate of 87.8% and 55.6%, respectively(8).

1.2.2.4. Obstetric complications of mothers. among mothers who gave birth in Suhul hospital from September 2012 to August 30, 2013

A study conducted in Pakistan shows hypertensive disorders

and obstructed are the most frequent cause of PNM(16) . A study done in Africa Ghana The most common cause of intrapartum stillbirths obstetric complications were due to obstructed labour, cord prolapse and malpresentation(17)

In Ethiopia research in shows that hypertensive disorders of pregnancy (all severe preeclampsia or eclampsia), obstructed labor, and malpresentations were the commonest obstetric complications in the cases than in the controls(8).

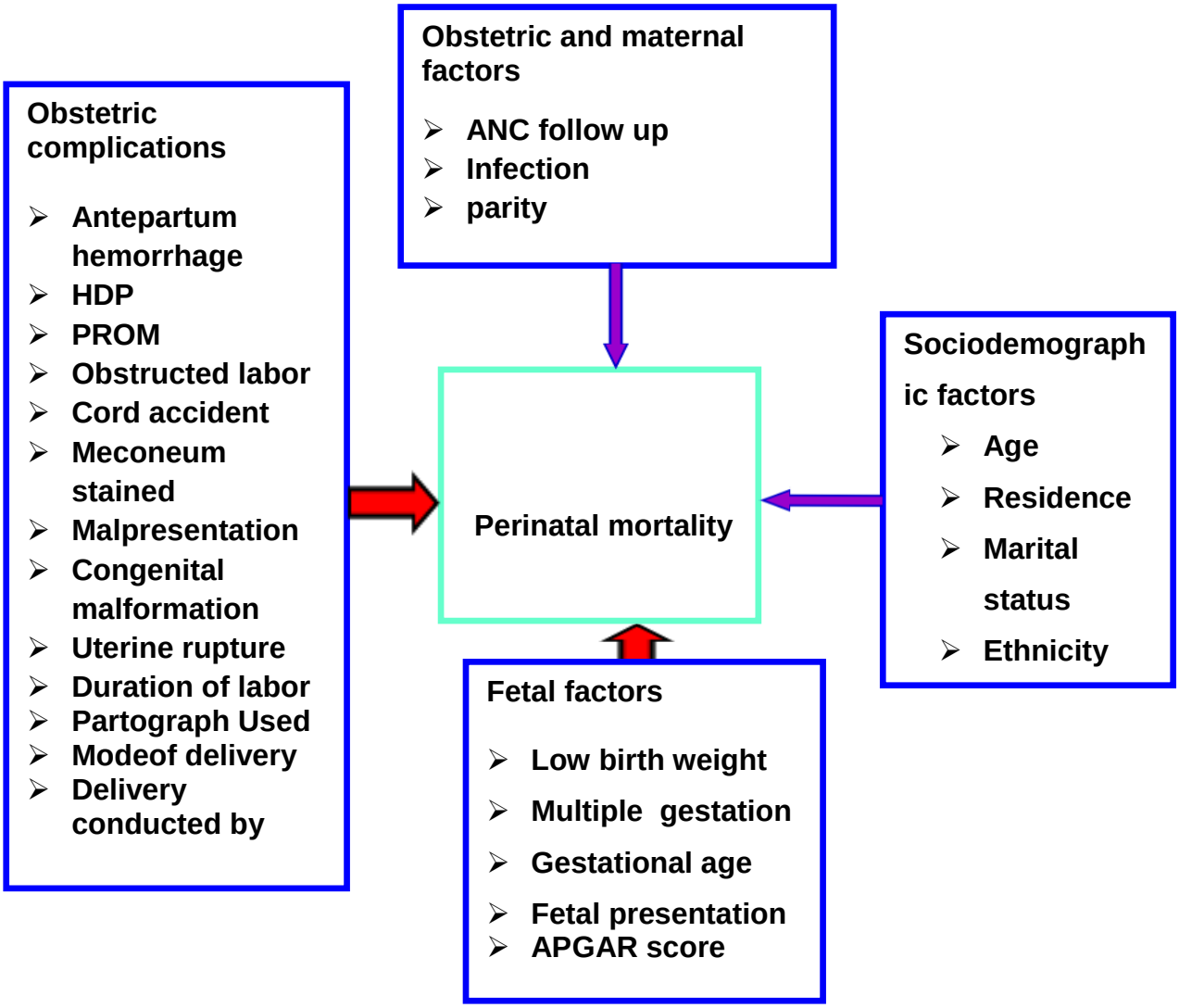

Fig: 1. CONCPTUAL FRAME WORK FOR FACTORS AFFECTING PERINATAL MORTALITY IN SUHUL 2014(4, 8).

1.3. Justification of the study

Perinatal mortality is a global public challenge that causes a severe threat for both the mother and the new born similarly. Since perinatal mortality is affected by multiple factor identifying the factors that mainly affect perinatal mortality improves health service delivery system. Perinatal mortality rate is one of the key indicators of the development and the health service delivery of a country. Therefore determine the rate and identify the factors is one input to improve the health delivery system. In developing countries studies related to perinatal mortality are very rare. In Ethiopia little is known about the factors that affect perinatal mortality so conducting this study helps in achieving the MDGs especially MDG5.As far as my knowledge is concerned there is no study conducted in this study area. Therefore the findings from this study gives evidence based information to Ethiopia especially to the study area.

2. Objectives

2.2. General objective

To assess perinatal mortality rate and its associated factors among mothers who gave birth in Suhul hospital, shire town Tigray region, from September1, 2012 to August 30, 2013.

2.3. Specific objective

- ✓ To determine perinatal mortality rate among mothers who gave birth in Suhul hospital, shire town Tigray region, from September1, 2012 to August 30, 2013.
- ✓ To identify factors associated with perinatal mortality among mothers who gave birth in Suhul hospital, shire town Tigray region, from September1, 2012 to August 30, 2013.

3. Methods

3.1. Study design

Institutional based case control study was conducted among Mothers who gave birth in Suhul hospital, shire town.

3.2. Study Area and Period

The study was conducted in Suhul hospital of shire town from May 2014 to July 2014. Shire Town is located 304 km from Mekelle & 1087 km from Addis Ababa Population: Total population of the north western Tigray zone is 736,805, of whom 368,254 are men and 368,551 are women of this 23.6% are in the reproductive age group. In the town there are 3 governmental and 2 private health institutions which provide services related to delivery.

3.3. Source and Study population:

The source population: All mothers who gave birth the cases (stillbirth neonatal death) and the controls (all live births) at Suhul hospital.

Study population: All mothers who gave birth the cases (stillbirth neonatal death) and the controls (all live births) at Suhul hospital from September 1, 2012 to August 30, 2013.

3.3.1. Inclusion criteria

All mothers who gave birth at Suhul hospital from September 1, 2012 to August 30, 2013.

3.3.2. Exclusion criteria

Mothers who gave birth in Suhul hospital from September 1, 2012 to August 30, 2013 but their medical charts were incomplete.

3.3.3. Sample size determination

In this study, sample size was determined based on the assumption that obstructed labor (has significant association with perinatal mortality in multivariate analysis) is the commonest cause of perinatal mortality with (AOR=19.8 CI (7.58-51.90) in a study conducted in Hawassa university teaching hospital and using STATCALC program of EPI info version 3.5.3. with case to control ratio of 1:2. to obtain the maximum sample size.

Therefore the total sample size calculated require achieving 95% confidence level and power of 80% and adjusted odds ratio of 19.8 for obstructed labor was1134 (378 for cases and 756 for controls). For possible incomplete cards during the study the final sample size is increased by10% to n = 1134 +10% which is 114 = 1248. Therefore, the total sample size including 10% for incomplete cards was 1248(416 for cases and 832 for controls).

3.3.4. Sampling technique:

Computer based simple random sampling method was employed to select maternal charts from the total deliveries of the two years**.**

3.4. Variables of the study

3.4.1. Dependant variable

- Perinatal mortality

3.4.2. Independent variables

- **Socio-demographic characteristics of mothers**
  - ✓ Age
  - ✓ Residence
  - ✓ Marital status
  - ✓ Ethnicity

- **Obstetrics and maternal condition of mothers**
  - ANC follow up
  - Parity
  - HIV status
- **Obstetric factors:**
  - Mode of delivery
  - Antepartum hemorrhage
  - Hypertensive disorder
  - PROM
  - Obstructed labor
  - Cord accidents
  - Meconeum stained
  - Malpresentation.
  - *Duration of labor in hours*
  - Partograph Used
  - Induction or augmentation done
  - Mode of delivery
  - Delivery conducted by
- **Fetal factors**:
  - Birth weight(kg)
  - Gestational age(wks)
  - Fetalpresentation
  - First minute Apgar score
  - Fifth minute Apgar score
  - Presence of Meconeum aspiration
  - Presence of birth asphyxia
  - Sex
  - Fetuses number

3.5. Operational definition

Perinatal death: All still births and early neonatal deaths delivered after 28 weeks of gestation till discharge.

Early neonatal deaths: death of the neonate that occurred from birth till discharge from the hospital.

3.6. Data collection procedures

Data was collected from maternal charts and delivery registration books to asses socio-demographic, maternal factor, fetal factors, obstetric factors and labor and delivery conditions of the mother between the years 2012and 2013.

Data was collected by reviewing maternal charts using a structured and pre-tested questionnaire. Training was given for three data collectors and two supervisors

3.7. Data quality control

The questionnaire was pretested on 5% maternal medical charts in Aksum hospital. Three days Training for data collectors and supervisors was given. The trained data collector's skill of reviewing was checked during their practice. Every day, reviewed & checked by supervisors & principal investigator and feedback was given to data collectors. Double data entry was used to minimize the error during the entry.

3.8. Data processing and analysis

Data check, code, entered- EPI Info 7.1.2 and exported to SPSS version 20 soft ware package for analysis. Analysis: by using logistic regression model. Results presented -tables, figures and text using frequencies, percentage & summary statistics like mean & SD Level of significance was measured at p –v<0.05. The degree of association was measured by - odds ratio with 95%CI.

4. Ethical consideration

Ethical clearance was obtained from University of Gondar, Collage of Medicine and Health science Department of midwifery. Support letter was given from the department of midwifery to Tigray health bureau and Suhul hospital. Then reviewing of the registration books and charts was conducted.

5. Result

A total of 1128 (90.4%) cards (376 for cases and 752 for controls) were included in this analysis.120 (9.6%) of the cards were incomplete & excluded

5.1. **Socio demographic and Obstetric Characteristics of Mothers among mothers who gave birth in Suhul hospital, shire town Tigray region, from September1, 2012 to August 30, 2013.**

The study was conducted among 417 (37.0%) urban and 711 (63.0%) rural residents. Out of the total 1128 mothers 376 were cases and 752 were controls Among the 376 case 85 (22.6%) were urban while 291 (77.4%) rural. From 752 of the control group 332 (44.1%) of them were urban where as 420 (55.9%) were rural.

Among the total study subjects 273 (24.2%) were less than 20 years while 678 (60.1%) were between 20-34 years, 177 (15.7%) were greater than 35 years of age. Majority of the cases about 208 (55.3%) and controls 470 (62.5%) were between 20-34 years. Mothers who were 35 years and above were higher in the cases than in the control group (19.7%versus 13.7%, respectively). The mean age of mothers for cases and controls was 27.4**±**7.3and 25.5± 6.8years, respectively.

Nine hundred sixty one (85.2%) of the subjects were married, 167 (14.8%) were single. Among the study subjects 1043(92.5%) were Tigrians and 85(7.5%) were other (Amhara, Oromo and Eritreans) (Table1)

Table: 1. **Socio-demographic characteristics of cases and controls, among mothers who gave birth in Suhul hospital from September 1, 2012 to August 2013.**

Variable	category	Cases N =376	Controls N=752	Total N=1128
Maternal age	< 20	94 (25.0%)	179 (23.8%)	273 (24.2%)
	20 – 34	208 (55.3%)	470 (62.5%)	678 (60.1%)
	35+	74 (19.7%)	103 (13.7%)	177 (15.7%)
Maternal residence	Rural	291 (77.4%)	420 (55.9%)	711 (63.0%)
	Urban	85 (22.6%)	332 (44.1%)	417 (37.0%)
Ethnicity	Tigray	348(92.6%)	695(92.4%)	1043(92.5%)
	Other	28(7.4%	57(7.6%)	85(7.5%)
marital status	single	51 (13.6%)	116 (15.4%)	167 (14.8%)
	married	325 (86.4%)	636 (84.6%)	961 (85.2%)

5.2. **Obstetrics and maternal condition of the mothers among mothers who gave birth in Suhul hospital from September 1, 2012 to August 2013.**

Out of the total 1128 study subjects 978 (86.7%) of them had regular ANC follow up however 150 (13.3%) of study subjects did not have ANC follow up. The number of cases and controls whose mothers had antenatal follow up were 260(69.1%) and 718 (95.5%) respectively.

Among the total study subjects 436 (38.7%) were Para one, 479 (42.5%) of them were multipara where as 213 (18.9%) were grand multipara. Grand multipara mothers were higher in the cases than in the controls (27.1%, 14.8%, respectively). Among the total subjects screening for HIV 1101(97.6%) were negative. (Table2)

Table2: Obstetrics and maternal condition of the mothers who gave birth in Suhul hospital from September 1, 2012 to August 30, 2013.

Variable	category	Cases N =376	Controls N=752	Total N=1128
ANC followup	Yes	260(69.1%)	718(95.5%)	978 (86.7%)
	No	116(30.9%)	34 (4.5%)	150 (13.3%)
Parity	1	140(37.2%)	296 (39.4%)	436 (38.7%)
	2-4	134(35.6%)	345 (45.9%)	479 (42.5%)
	5+	102(27.1%)	111 (14.8%)	213 (18.9%)
HIV status	Negative	370(98.4%)	731 (97.2%)	1101(97.6%)
	positive	6(1.6%)	21(2.8%)	27 (2.4%)

5.3. **Fetal factors and newborn condition of mothers who gave birth in Suhul hospital from September 1, 2012 to August 30, 2013.**

Among the study subjects 57 (5.1%) were mothers who gave birth to a very low birth (<1.5kg) weight neonate, 142 (12.6%) of them were gave birth to low birth weight (1.5-2.4kg) neonate while 807 (71.5%) of the mothers gave birth to neonate weighing (2.5-4kg). Mothers who gave birth to <1.5kg and 1.5-2.4kg were higher in the cases than controls.

Out of the total study subjects 170 (15.1%) mothers gave birth to preterm gestational age neonates (28-36wks). Most neonates 798 (70.8%) were delivered at term. The proportion of mothers who gave birth to preterm neonates was higher in the cases than the controls (31.2%, 6.9%, respectively).

Among the cases, only 290 (77.1%) had vertex presentation while it was 669 (89.0%) in the controls. From the total births, 353 (31.3%) had very low 1st minute Apgar score (0-3). Of which, 346 (92.0%) were among the cases. Out of the total births 587 (52.0%) were males and 541 (48.0%) were female. **(Table3)**

Table: 3. Fetal factors and newborn condition of mothers who gave birth in Suhul hospital from September 1, 2012 to August 2013.

Variable	category	Cases N =376	Controls N=752	Total N=1128
Birth weight	<1.5	49 (13.0%)	8 (1.1%)	57 (5.1%)
	1.5-2.4	82 (21.8%)	60 (8.0%)	142 (12.6%)
	2.5-4	225 (59.8%)	582 (77.4%)	807 (71.5%)
	>4	20 (5.3%)	102 (13.6%)	122 (10.8%)
Gestational age	Preterm	118 (31.2%)	52 (6.9%)	170 (15.1%)
	Term	195 (52.0%)	603 (80.2%)	798 (70.8%)
	Post term	14 (3.7%)	19 (2.5%)	33(2.8%)
	unknown	49(13.1%)	78(10.4%)	127(11.3%)
Fetalpresentation	Vertex	290 (77.1%)	669 (89.0%)	959 (85.0%)
	Breech	52 (13.8%)	54 (7.2%)	106 (9.4%)
	Transverse	26 (6.9%)	15(2.0%)	41 (3.6%)
	other	8 (2.1%)	14 (1.9%)	22 (2.0%)
First minute	0-3	346 (92.0%)	7 (0.9%)	353 (31.3%)
Apgar score	4-6	29 (7.7%)	128 (17.0%)	157 (13.9%)
	7-10	1 (0.3%)	617 (82.0%)	618 (54.8%)
Fifth minute	0-3	357 (94.9%)	4 (0.5%)	361 (32.0%)
Apgar score	4-6	14 (3.7%)	74 (9.8%)	88 (7.8%)
	7-10	5 (1.3%)	674 (89.6%)	679 (60.2%)
Meconeum	Yes	52(13.8%)	51(6.8%)	103(9.1%)
aspiration	No	324(86.2%)	701(93.2%)	1025(90.9%)
Birth asphyxia	Yes	58(15.4%)	56(7.4%)	114(10.1%)
	No	318(84.6%)	696(92.6%)	1014(89.9%)
sex	Male	213 (56.6%)	374 (49.7%)	587 (52.0%)
	Female	163 (43.4%)	378 (50.3%)	541 (48.0%)

5.4. **Obstetric complications among mothers who gave birth in Suhul hospital from September 1, 2012 to August 30, 2013.**

Among the study subjects 39 (3.5%) of the mothers had Antepartum hemorrhage of which 24 (6.4%) were occurred in the case. Regarding hypertensive disorders out of the total birth 56 (5.0%) were hypertensive of this 33 (8.8%) were in the cases.

Fifty two of the total labours (4.6%) were obstructed labor of which the proportion of obstructed labor in the cases was higher than in the controls (11.4%, 1.2%, respectively). Out of the total study subjects 14 (3.7%) of them had faced uterine rupture and all of them were occurred in the cases. Out of the total thirty two cord accidents occurred in the total births 26 (6.9%) were happened in the cases.

Antepartum hemorrhage, hypertensive disorders of pregnancy (all severe preeclampsia or eclampsia), uterine rupture, obstructed labor, malpresentations premature rupture of fetal membranes (PROM) and meconium stained amniotic fluid were the commonest obstetric complications in the cases than in the controls.

Among the total study subjects who gave birth 499(44.2%) were gave birth with in less than 12hrs of labor duration; 479(42.5%) were gave birth within 12-24hrs of labor duration and 150(13.3%) were gave birth after 25hrs and above of labor duration. The proportion of cases who gave birth above 25hrs were higher in the cases than the controls 83(22.1%) and 67(8.9%) respectively. The median duration of labor in the cases and the controls group was 18and 12 hours, respectively.

Most of the mothers of the total labor and deliveries, 819(72.6%) were followed their labor and fetal condition using partograph. Mothers who were not followed their labor and fetal condition using partograph were higher in the cases than the controls (41.5%and 20.3% respectively).Two hundred ninety one (77.4%) of the cases and six hundred thirty four (84.4%) of the controls were delivered vaginally. Out of the total labor and deliveries attended 634 (56.2%) were attended by midwife; 199(17.6%) by Gynecologist; 217(19.2%) by students and 31(2.7%) by others (GP, OH) (Table4)

Table: 4. Obstetric complications among mothers who gave birth in Suhul hospital from September 1, 2012 to August 30, 2013.

Variable	category	Cases N =376	Controls N=752	Total N=1128
Antepartum hemorrhage	Yes	24 (6.4%)	15 (2.0%)	39 (3.5%)
	No	352(93.6%)	737 (98.0%)	1089 (96.5%)
Hypertensive disorder	Yes	33 (8.8%)	23 (3.1%)	56 (5.0%)
	No	343(91.2%)	729 (96.9%)	1072 (95.0%)
PROM	Yes	33 (8.8%)	41 (5.5%)	74 (6.6%)
	No	343(91.2%)	711 (94.5%)	1054 (93.4%)
Obstructed labor	Yes	43 (11.4%)	9 (1.2%)	52 (4.6%)
	No	333(88.6%)	743 (98.8%)	1076 (95.4%)
Uterine rupture	Yes	14 (3.7%)	0(0)	14 (1.2%)
	No	362(96.3%)	752(100)	1114(98.8%)
Cord accident	Yes	26 (6.9%)	6 (0.8%)	32 (2.8%)
	No	350(93.1%)	746 (99.2%)	1096 (97.2%)
Malpresentation	Yes	80 (21.3%)	65 (8.6%)	145 (12.9%)
	No	296(78.7%)	687 (91.4%)	983 (87.1%)
Meconeum stained	Yes	23 (6.1%)	16 (2.1%)	39 (3.5%)
	No	353(93.9%)	736 (97.9%)	1089 (96.5%)
Congenital malformation	Yes	26(6.9%)	3(0.4%)	29(2.6%)
	No	350(93.1%)	749(99.6%)	1099(97.4%)
Other	Yes	34 (9.0%)	32 (4.3%)	66 (5.9%)
	No	342(91.0%)	720 (95.7%)	1062 (94.1%)

Obstetric complications among mothers who gave birth in Suhul hospital from September 1, 2012 to August 30, 2013.

variable	Category	Case N=376	Control N= 752	Total N= 1128
Duration of labor in hours	<12	102(27.1%)	397(52.8%)	499(44.2%)
	12-24	191(50.8%)	288(38.3%)	479(42.5%)
	25-48	83(22.1%)	67(8.9%)	150(13.3%)
Partograph Used	Yes	220(58.5%)	599(79.7%)	819(72.6%)
	No	156(41.5%)	153(20.3%)	309(27.4%)
Inductionor augmentation done	Yes	69(18.4%)	141(18.8%)	210(18.6%)
	No	307(81.6%)	611(81.2%)	918(81.4%)
Modeof delivery	Spontaneous vaginal	291(77.4%)	634(84.4%)	925(82%)
	Instrumental	35(9.3%)	65(8.6%)	100(8.9%)
	Caesarean section	50(13.3%)	53(7%)	103(9.1%)
Delivery conducted by	Midwife	186(49.5%)	448(59.6%)	634 (56.2%)
	Gynecologist	83(22.1%)	116(15.4%)	199(17.6%)
	students	77(20.5%)	140(18.6%)	217(19.2%)
	Other	15(4.0%)	16(2.1%)	31(2.7%)

Perinatal mortality rate

The perinatal mortality rate is 131 per thousand live births. 319 (84.8%) of the total perinatal deaths included in this study were still birth. 278(73.9%) of the stillbirth were admitted to the hospital with negative fetal heart beat. 41 (10.9%) of the stillbirth were admitted to the hospital with positive fetal heartbeats and later on were reported as hospital stillbirths. Proportion of hospital deaths was 98(26.1%)

Table: 5. Frequency of deliveries and perinatal mortality rate among mothers gave birth in Suhul hospital from September 1, 2012 to August 30, 2013.

Variable	Number
Total number of deliveries	3194
Total perinatal deaths	419
Total number of still births	362
Total early neonatal deaths	57
Perinatal mortality rate	131/1000
Still birth rate	113/1000
Early neonatal death rate	17.8/1000

5.5. Factors associated with perinatal mortality

5.5.1. Socio demographic and obstetric characteristics of mothers of cases and controls:

Comparison between mothers having perinatal mortality and those who don't have been made for difference in factors associated with perinatal morality. Bivariate analysis showed that there was statistically significant association between perinatal morality and residence

In multivariate analysis, there was no statistically significant association between perinatal mortality and residence.

5.5.2. Obstetrics and maternal condition of the mothers of cases and controls:

Bivariate analysis showed that there was statistically significant association between perinatal mortality and ANC follow up and parity. Multivariate analysis showed that there was statistically significant association between perinatal mortality and ANC follow up. Both the bivariate analysis and multivariate analysis showed that the perinatal mortality rate was highest among mothers who had no ANC follow up.

In the crude analysis mothers who had no ANC follow up had 9.4 times increased risk of having perinatal mortality than those who had ANC follow up. In this analysis both the crude and adjusted analysis showed that mothers who had no ANC follow up had 9.4 (AOR=6.9(4.2-11.5) times increased risk of having perinatal mortality than those who had ANC follow up respectively.

5.5.3. Fetal factors and newborn condition

Bivariate analysis showed that there was statistically significant association between perinatal mortality and birth weight, gestational age, fetal presentation, meconeum aspiration and birth asphyxia.

In multivariate analysis, there was statistically significant association between perinatal mortality and birth weight, gestational age and meconeum aspiration.
Very low and low birth weight newborns had (AOR=9.9(4.1-24.5) and (AOR=3.2 (1.9-5.3) times increased risk of perinatal mortality than normal weight newborns

5.5.4. Obstetric complications among mothers who have birth in Suhul hospital from 2012-2013

Bivariate analysis showed that there was statistically significant association between Perinatal mortality and the obstetric complications; antepartum haemorrhage, hypertensive disorder, obstructed labor, cord accident, malpresentation and PROM

Multivariate analysis showed that there was statistically significant association between perinatal mortality and hypertensive disorder, obstructed labor, cord accident, malpresentation and PROM. However, there was no statistically significant association between perinatal mortality and antepartum haemorrhage in multivariate analysis.

Both the bivariate and multivariate analysis showed that mother who had hypertensive disorder had 3(1.8-5.3) and (AOR=3.8(1.8-7.8) times increased risk of having than those who did not have the hypertensive disorder.

In multivariate analysis, the likelihood of having perinatal mortality among mother who had obstructed labor was (AOR=7.7CI (3.1-18.5) higher when we compared with those mothers who had no obstructed labor.

In this analysis, both the crude and adjusted analysis showed that there was statistically significant association between perinatal mortality and cord accident, malpresentation and PROM. In multivariate analysis, mothers who had cord accident had (AOR=5 CI (1.7-14.) five times increased risk of having perinatal mortality than those who did not have cord accident.
Both crude and adjusted analysis showed that there was statistically significant association between perinatal mortality and duration of labor.
In multivariate analysis mothers who had been stayed in labor for about 12-24 hrs were (AOR=2.4 CI ((1.6-3.5) two times at increased risk of having perinatal mortality

when we compared with those mothers who had been stayed in labor for less than twelve hours.

In multivariate analysis the likelihood mothers to have perinatal mortality in mothers who had been stayed in labor for about 25-48 hrs was (AOR= 3.1 CI (1.8-5.3) three times having the risk than those mothers who had been waited to give birth for about less the 12hrs.

Table: 7. Binary and multiple logistic regressions of selected variables in relation to perinatal mortality in Suhul hospital from September1, 2012 to August 30, 2013.

Variable	Cases N=376	Controls N=752	Crude OR (95%CI)	Adjusted OR (95% CI)	p-value
Residence					
Rural	291	420	2.7(2- 3.6)	1.5(1.1-2.2)	0.051
Urban	85	332			
Parity					
I	140	296	1.2(0.9-1.6)	0.9(0.6-1.4)	0.736
V+	1o2	111	2.4(1.7-3.3)	1.2(0.73-1.93)	0.503
II-IV	134	345			
ANC followup					
No	116	34	9.4(6.3-14.2)	6.9(4.2-11.5)	0.000
Yes	260	718			
Antepartum haemorrhage					
Yes	24	15	3.4(1.7-6.5)	1.9(0.7-4.5)	0.185
No	352	737			
hypertensive disorder					
Yes	33	23	3(1.8-5.3)	3.8(1.8-7.8)	0.000
No	343	729			
PROM					
Yes	33	41	1.7(1.-2.7)	1.8(0.9-3.4)	0.065
No	343	711			
Obstructed labor					
Yes	43	9	10.7(5.1-22.1)	7.7(3.1-18.5)	0.000
No	333	743			
cord accident					
Yes	26	6	9.2(3.8-22.6)	5(1.7-14.)	0.004
No	350	746			
Malpresentation					
Yes	80	65	2.9(2-4.1)	1.7(1-2.8)	0.042
No	296	687			

Partograph					
Yes	220	599	2.8(2.1-3.6)	2.386(1.6-3.5)	0.051
No	156	153			
Modeof delivery					
instrumental	35	65	1.1(0.7-1.8)	0.5(0.2-1.6)	0.248
Caesarean Section	50	53	2.1(1.4-3.1)	0.8(0.4-1.4)	0.407
spontaneous	291	634			
Birth weight					
<1.5	49	8	15.8(7.4-33.9)	9.9(4.1-24.5)	0.000
1.5-2.4	82	60	3.5(2.5-5.1)	3.2(1.9-5.3)	0.000
>4	20	102	0.5(0.3-0.8)	0.4(0.2-0.8)	0.010
2.5-4	225	582			
Gestational age					
Pre term	118	52	7.017(4.9-10.1)	2.8(1.7-4.6)	0.000
Post term	14	19	2.3(1.1-4.6)	1.6(0.7-3.9)	0.296
Term	195	603			
Duration of labor(hrs)					
12-24	191	288	2.6(1.9-3.4)	2.4(1.6-3.5)	0.000
25-48	83	67	4.8(*3.3*-7.1)	3.1(1.8-5.3)	0.000
<12	102	397			
Meconeum aspiration					
Yes	52	51	2.2(1.5-3.3)	1.9(1.1-3.3)	0.028
No	324	701			
Birth asphyxia					
Yes	58	56	2.3(1.5-3.3)	1.4(0.8-2.5)	0.213
No	318	696			

6. Discussion

The perinatal mortality rate in this study was high. The possible explanation to this marked disparity between this study result and other results might be the differences in antepartum and intrapartum care in the different settings. Another explanation might be being a referral hospital to district hospitals and surrounding health centrs is necessary to be considered.

In this study the perinatal mortality rate (131per thousand live births) was lower than the study conducted in Jimma hospital, a teaching hospital in South-Western Ethiopia (138.9 per thousand live births)(2). But it was higher when comparing with research done in Hawassa University teaching hospital south Ethiopia (90 per thousand live births)(8). This is most likely because most of the mothers of the cases in this study (18) came with serious obstetric complications.

Therefore, such hospital based perinatal death studies may not reflect rather may overestimate the real perinatal mortalities at the community level, which was also distinguished by preceding researchers as a potential for selective referral bias(19).
The PMR of this study is very high when we compared with WHO global estimate, which were 10 per 1000 live births in high income countries of the world and 50 per 1000 live births in low income countries(4).

This study demonstrated that there was high PMR when we compared with the hospital based study done in Nigeria with perinatal mortality of rate of 84.6/1000 births(7). The difference with Nigeria might be due to different study areas.

In this study having regular ANC follow up reduces perinatal mortality. In the opposite no regular ANC increase risk of perinatal mortality (AOR=6.9(4.2-11.5).This in line with study done in India revealed that lack of antenatal care was significantly associated with high perinatal mortality rate (AOR =5.5, 95% CI (1.58–19.16).
It is also in line with study conducted in Zimbabwe lack of antenatal care was associated with perinatal mortality rate (AOR=2.52 95% CI (1.63 – 3.91)(6, 20)
This could be explained by: ANC follow up might help in early detection and management of preventable obstetric complications.

Very low weight newborns had 9.9 times increased risk of perinatal mortality than normal weight newborns (AOR=9.9 95% CI (4.1-24.5). In line with study conducted in Hawassa had 16.2 times increased risk of perinatal mortality than normal weight newborns (AOR=16.2,95% CI (6.06-43.02) and inconsistent with study conducted in Pakistan, Very low weight newborns had 5.6 increased risk of perinatal mortality than normal weight newborns (AOR =5.6 , 95%, CI (2.3–13.6)(8, 11).

It is also inconsistent with studies done in Nigeria, India, and Bangladesh showed that Very low weight newborns were more likely to face perinatal mortality than normal weight newborns. Possible explanation for this may be very low birth weight new borns might be exposed easily to hypothermia, hypoglycaemia and early neonatal sepsis.

Mothers with hypertensive disorder (8.8%) were 3.8 times at increased risk of having perinatal mortality than those who did not have the disorder. (AOR=3.8, 95%, CI (1.8-7.8). This is in consistent with the study done in Tanzania hypertensive disorder was significantly associated with PNM with (AOR =8.1, 95%CI (1.79 – 36.3,*)(19).*

This is in line with the study done in Pakistan and Nigeria which stated that the risk factor hypertensive disorder resulted in 20.4% PNDs & being hypertension resulted in 43.2% PNDs respectively. This might be due to lack of ANC follow up, IEC lack of acknowledgement on the benefits health intuition on preventing obstetrics complications such as hypertensive disorders.

Mothers who had cord accident had five times increased risk of having perinatal mortality than those who did not have the accident (AOR=5, 95%, CI (1.7-14). This is in line with study conducted in Hawassa teaching hospital AOR=15.9 95%, CI (4.28-59.1)(8). Consistent with the studies done in western Tanzania, Bangladesh, India. This might be due to lack of oxygen to the fetus and lack of skill to Dx the case.

7. Conclusion:

The perinatal mortality rate in this study was high. Low birth weight obstracted labor, cord accident pregnancy induced hypertension, and absence of ANC follow up during pregnancy were factors significantly associated with perinatal mortality. To reduce it, efforts should be made to encourage pregnant women to book for antenatal care in order to reduce and detect some of the risk factors. Also when they do occur, efforts should be made to determine the cause of death as the information may help in designing strategies to prevent other perinatal deaths.

8. Limitation of the study

The possible limitation of this study was, being secondary data and since the study is done from 28wks of gestation till discharge all neonatal deaths up to seven days were not accessed. Being a hospital based study and retrospective nature of the study

9. Recommendation

To Tigray health bureau: increasing awareness of the community about the importance of antenatal care follows up through information, education and communication.

To Suhul hospital: provide regular health education on the causes of perinatal mortality and make effort to identify the main factors which account for perinatal mortality in the hospital.

To the community at large: There is a need to improve the utilization of health service institution for the management of obstetrics complication

To researchers: Similar case control study is beneficial to identify the main factors associated with perinatal mortality.

10. Reference

1.Lander T. Neonatal and perinatal mortality: country, regional and global estimates: World Health Organization; 2006.
2.Gaym A. Perinatal mortality audit at Jimma hospital, South-Western Ethiopia, 1990-1999. Ethiopian journal of health development. 2000;14(3):335-44.
3.Zupan J. Perinatal mortality in developing countries. New England Journal of Medicine. 2005;352(20):2047-8.
4.Ezechi OC, David AN. Overview of Global Perinatal Mortality: INTECH Open Access Publisher; 2012.
5.Van Lerberghe W, Manuel A, Matthews Z, Cathy W. The World Health Report 2005-make every mother and child count: World Health Organization; 2005.
6.Bhattacharya S, Mukhopadhyay G, Mistry PK, Pati S, Saha SP. Stillbirth in a tertiary care referral hospital in north Bengal-A review of causes, risk factors and prevention strategies. Online Journal of Health and Allied Sciences. 2011;9(4).
7.Ekure E, Ezeaka V, Iroha E, Egri-Okwaji M. Prospective audit of perinatal mortality among inborn babies in a tertiary health center in Lagos, Nigeria. Nigerian journal of clinical practice. 2011;14(1).
8.Bayou G, Berhan Y. Perinatal mortality and associated risk factors: a case control study. Ethiopian journal of health sciences. 2012;22(3).
9.Mavalankar DV, Trivedi C, Gray R. Levels and risk factors for perinatal mortality in Ahmedabad, India. Bulletin of the World Health Organization. 1991;69(4):435.
10.Erdem G. Perinatal mortality in Turkey. Paediatric and perinatal epidemiology. 2003;17(1):17-21.
11.Jehan I, Harris H, Salat S, Zeb A, Mobeen N, Pasha O, et al. Neonatal mortality, risk factors and causes: a prospective population-based cohort study in urban Pakistan. Bulletin of the world Health Organization. 2009;87(2):130-8.
12.Engmann C, Walega P, Aborigo RA, Adongo P, Moyer CA, Lavasani L, et al. Stillbirths and early neonatal mortality in rural Northern Ghana. Tropical Medicine & International Health. 2012;17(3):272-82.
13.McDermott J, Steketee R, Wirima J. Perinatal mortality in rural Malawi. Bulletin of the World Health Organization. 1996;74(2):165.
14.Jammeh A, Vangen S, Sundby J. Stillbirths in rural hospitals in The Gambia: a cross-sectional retrospective study. Obstetrics and gynecology international. 2010;2010.
15.Leach A, McArdle T, Banya W, Krubally O, Greenwood A, Rands C, et al. Neonatal mortality in a rural area of The Gambia. Annals of Tropical Paediatrics: International Child Health. 1999;19(1):33-43.
16.Nath JD, Das GC. The perinatal mortality in Ga college, Assam. 2014.
17.Edmond KM, Quigley MA, Zandoh C, Danso S, Hurt C, Agyei SO, et al. Aetiology of stillbirths and neonatal deaths in rural Ghana: implications for health programming in developing countries. Paediatric and perinatal epidemiology. 2008;22(5):430-7.
18.Berhan Y, Abdela A. Emergency obstetric performance with emphasis on operative delivery outcomes Does it reflect on the quality of care? Ethiopian journal of health development. 2004;18(2):96-106.
19.Kidanto HL, Mogren I, van Roosmalen J, Thomas AN, Massawe SN, Nystrom L, et al. Introduction of a qualitative perinatal audit at Muhimbili National Hospital, Dar es Salaam, Tanzania. BMC pregnancy and childbirth. 2009;9(1):45.
20.Feresu SA, Harlow SD, Welch K, Gillespie BW. Incidence of stillbirth and perinatal mortality and their associated factors among women delivering at Harare

Maternity Hospital, Zimbabwe: a cross-sectional retrospective analysis. BMC pregnancy and childbirth. 2005;5(1):9.

Annex 1.

A STRUCTURED QUESTIONARE TO ASSESS PERINATAL MORTALITY & ASSOCIATED FACTORS AMONG MOTHERS WHO GAVE BIRTH IN SUHUL HOSPITAL, SHIRE TOWN, NORTH ETHIOPIA IN THE YEARS OF 2012&2013

No.	Question /checklist/	Response	Remark
	I. Socio-Demographic characteristics of mothers who gave birth in Suhul hospital , shire town, North Ethiopia(2012-2013)		
101.	Age of mother (years)	_____	
102	Maternal residence	1. Rural 2. Urban	
103	Marital status	1. Single 2. Married	
104	Ethnicity	1. Tigray 2. Amhara 3. Oromo 4. Other _____	
	II. Obstetrics and maternal condition of mothers who gave birth in Suhul hospital, shire town, North Ethiopia(2012-2013)		
105	ANC followup	1. Yes 2. N0	
106	Gravidity	_____	
107	Parity	_____	
108	HIV status	1. Negative	

		2. Positive	
	III. Presence of Obstetric complications in mothers who gave birth in Suhul hospital, shire town, North Ethiopia(2012-2013)		
109	Presence of obstetric complications	1. None 2. Antepartum hemorrhage 3. Hypertensive disorder 4. PROM 5. Obstructed labor 6. Cord prolapse 7. Meconeum stained 8. Malpresentation 9. Congenital malformation 10. Uterine rupture 11. Other	
	IV. Fetal factors and newborn condition of mothers who gave birth in Suhul hospital, shire town, North Ethiopia(2012-2013)		
201	Birth weight(kg)	_____	
202	Gestational age(wks)	_____	
203	Fetalpresentation	1. Vertex 2. Breech 3. Transverse **4.** Other_____	
204	First minute Apgar score	_____	
205	Fifth minute Apgar score	_____	
206	Presence of meconeum aspiration	1. Yes 2. No	
207	Presence of birth asphyxia	1. Yes	

		2. No	
208	sex	1. Male **2.** Female	
209	Fetuses number	1. Single 2. Multiple	
	V. Labor and delivery conditions of mothers who gave birth in Suhul hospital, shire town, North Ethiopia(2012-2013)		
301	*Duration of labor in hours*	_____	
302	Partograph Used	1. Yes 2. No	
303	Induction or augmentation done	1. Yes 2. No	
304	Mode of delivery	1. Spontaneous vaginal 2. Forceps 3. Vacuum 4. Caesarean section	
305	Delivery conducted by	1. Gynecologist 2. Midwife 3. students **4.** Other	

ANNEX2

Declaration

I, the undersigned, senior clinical midwifery student declare that this thesis is my original work in partial fulfilment of the requirement for the degree of Master IN CLINICAL MIDWIFERY

Name: _____

Signature: _____

Place of submission: Department of Midwifery, College of medicine and Health Sciences, University of Gondar.

Date of Submission: _____

This thesis work has been submitted for examination with my/our approval as university advisor(s).

Advisors

	Name	**Signature**
1.	_____	
	_____	
2.	_____	
	_____	